British Journal of Applied Linguistics
ISSN: 2754-5253
DOI: 10.32996/bjal
Journal Homepage: www.al-kindipublisher.com/index.php/bjal

BJAL
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

The Effectiveness of Using Bloom's Taxonomy to teach and assess Critical Thinking Skills in Secondary School

Mustapha Walaf
ELT Inspector and PhD Graduate, Ibn Tofail University, Morocco
Corresponding Author: Mustapha Walaf, **E-mail**: linguistwalaf@gmail.com

| ABSTRACT
Critical thinking has become an essential component of language education, particularly in developing learners' higher-order cognitive abilities. This study examines the applicability of the Revised Bloom's Taxonomy, proposed by Anderson and Krathwohl (2001), as a theoretical framework for fostering and assessing critical thinking skills among young Moroccan learners of English in secondary schools. The revised taxonomy classifies cognitive processes into lower-order thinking skills (remembering, understanding, and applying) and higher-order thinking skills (analysing, evaluating, and creating), providing educators with a practical framework for classroom instruction and assessment. Although scholars have identified limitations in Bloom's Taxonomy, arguing that it does not fully capture the complexity of critical thinking, it remains one of the most widely adopted educational frameworks due to its clarity, simplicity, and instructional value. Drawing on previous literature, this study argues that the Revised Bloom's Taxonomy offers an effective and accessible model for integrating critical thinking into English language teaching for young learners. The paper further highlights the relationship between Bloom's higher-order cognitive processes and critical thinking, as recognised by leading theorists, while acknowledging the taxonomy's conceptual limitations. The findings support the continued use of the Revised Bloom's Taxonomy as a valuable pedagogical tool for promoting critical thinking in Moroccan EFL classrooms.

| KEYWORDS

Revised Bloom's Taxonomy; critical thinking; higher-order thinking Skills (HOTS); Moroccan Secondary Schools; Young EFL Learners

| ARTICLE INFORMATION

ACCEPTED: 20 April 2026 **PUBLISHED:** 20 May 2026 **DOI:** 10.32996/bjal.2025.6.3.2

1. Introduction

The original Taxonomy of Educational Objectives, coined by Bloom (1956), was revised by Anderson & Krathwohl (2001) and is a theoretical framework for classifying cognitive skills into lower levels of thinking skills: knowledge, comprehension, and application, and higher levels of thinking skills, which are analysis, synthesis, and evaluation. This framework has been considered one of the most widely used taxonomies for evaluating critical thinking in the classroom (Bissell & Lemons, 2006; Brookhart, 2010). The Revised Bloom's Taxonomy framework has been used because it is more applicable for investigating critical thinking skills among young Moroccan learners of English in Middle schools and because it is simple. It deals with limited high-order thinking skills (HOTS). Additionally, it does not include all the cognitive and higher complex intellectual skills associated with critical thinking, namely analysing, evaluating, and creating (Anderson & Krathwohl, 2001).

Moreover, despite the shortcomings of Bloom's Taxonomy, this model remains a prominent part of educators' instructional toolkits because of its simplicity and straightforwardness. This reality is evidenced by the fact that several critical thinking theorists argue that addressing critical thinking can be effectively initiated through Bloom's taxonomy (Sternberg, 1986; Facione,

1990; Ennis, 1993; Halpern, 1998; Moseley et al., 2005). While criticising Bloom's taxonomy in relation to Critical Thinking instruction, Paul (1995) endorses the idea that there is a relationship between critical thinking and the three higher-order processes advocated by Bloom's Taxonomy, specifically, analysis, synthesis, and evaluation.

Since the concept of critical thinking is complex, various scholars have provided different definitions of the term (Alfadhli, 2008; Cuban, 1984; Morgan, 1995; Lewis & Smith, 1993, among others). Therefore, for the sake of simplification, this article illustrates how Bloom's taxonomy, as a theoretical framework, can help teachers of young learners teach critical thinking. This taxonomy classifies cognitive skills into lower levels of thinking: knowledge, comprehension, and application, and higher levels: analysis, synthesis, and evaluation. It has been considered one of the most widely used taxonomies by educators, including Bissell & Lemons (2006) and Brookhart (2010), for evaluating critical thinking in the classroom.

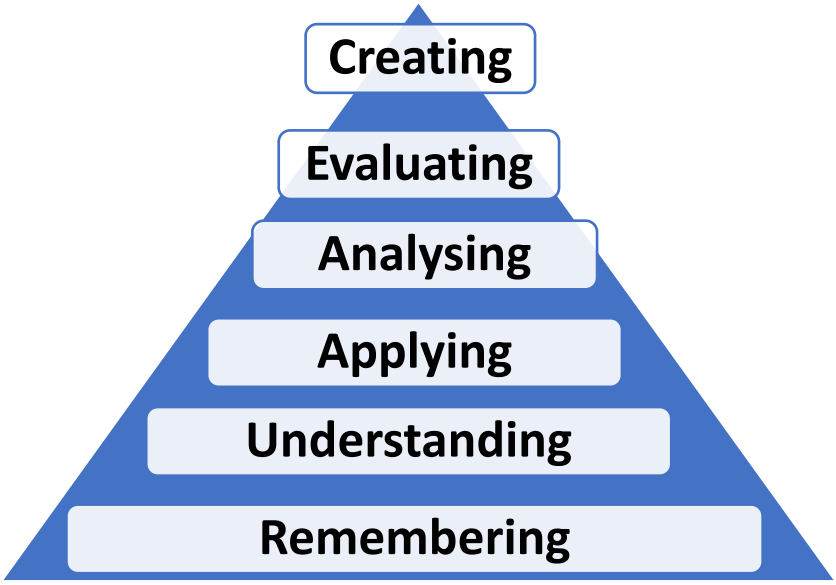
The revised Bloom's taxonomy by Anderson & Krathwohl (2001) classifies cognitive skills into lower levels of thinking: knowledge, comprehension, and application, and higher levels: analysis, synthesis, and evaluation. It has been considered one of the most dominant taxonomies being implemented by educators (Bissell & Lemons, 2006; Brookhart, 2010) while evaluating critical thinking in the classroom. The Revised Bloom's Taxonomy framework is more applicable to investigate critical thinking skills among young Moroccan learners of English in Middle schools, and it is simple and straightforward. It deals with limited high-order thinking skills (HOTS). Additionally, it does not include all the cognitive and higher complex intellectual skills associated with critical thinking, namely analysing, evaluating and creating (Anderson & Krathwohl, 2001). Moreover, despite the shortcomings of Bloom's Taxonomy, this model remains a prominent part of educators' instructional toolkits because of its simplicity and straightforwardness. This reality is evidenced by the fact that several critical thinking theorists argue that addressing critical thinking can be effectively initiated through Bloom's taxonomy (Sternberg, 1986; Facione, 1990; Ennis, 1993; Halpern, 1998; Moseley et al., 2005).

2. Revised Bloom's taxonomy

Benjamin Bloom devised Bloom's Taxonomy in 1965. It is a systematic approach for classifying the many levels of cognitive abilities that students employ to enhance their learning process. In 2001, a group of cognitive psychologists, curriculum theorists, and instructional researchers issued a revised version of Bloom's, reflecting a more dynamic classification understanding. Bloom's thinking skills are manifested by the diagram of the Revised Bloom's Taxonomy:

Figure 1

Revised Bloom's taxonomy



Note: A representation of Bloom's taxonomy, adapted from (Anderson & Krathwohl, 2001)

The above thinking levels are further represented by the revised Bloom's Taxonomy Action Verbs, which are as follows:

Table 2

Revised Bloom's Taxonomy Action Verbs

Remembering	Understanding	Applying	Analysing	Evaluating	Creating
Choose	Classify	Apply	Analyse	Agree	Adapt
Define	Demonstrate	Build	Assume	Assess	Build
Find	Explain	Choose	Categorise	Choose	Change
Label	Extend	Identify	Classify	Compare	Combine
List	Illustrate	Experiment	Compare	Conclude	Compile
Match	Infer	Identify	Conclude	Criticise	Compose
Name	Interpret	Interview	Contrast	Decide	Construct
Omit	Outline	Use	Discover	Deduct	Create
Recall	Relate	Model	Dissect	Defend	Design
Relate	Rephrase	Plan	Distinguish	Determine	Develop
Select	Show	Organise	Divide	Evaluate	Discuss
Show	Summarise	Select	Examine	Explain	Elaborate
Spell	Translate	utilise	Function	Interpret	Formulate
Tell			Infer	Judge	Imagine
				Justify	Improve
				Measure	Invent
				Prove	Make up
				Recommend	Modify
				Support	Predict
				value	Propose
					Solve

Note: A representation of Bloom's taxonomy Action Verbs Adapted from (Anderson & Krathwohl, 2001).

Moreover, despite the shortcomings of Bloom's Taxonomy, this model remains a prominent part of educators' toolkits for its simplicity and straightforwardness. This reality is proven by the fact that some critical thinking theorists believe that addressing critical thinking can be effectively initiated regarding Bloom's taxonomy, as shown while reviewing related literature, especially (Sternberg, 1986; Facione, 1990; Ennis, 1993; Halpern, 1998; Moseley et al., 2005). While criticising Bloom's taxonomy concerning Critical Thinking instruction, Paul (1985) endorses the idea that there is a relationship between critical thinking and the three higher-order processes advocated by Bloom's Taxonomy which are analysis, synthesis, and evaluation (Paul, 1985). In this sense, Paul (1985) certifies that most steps and procedures utilised to answer questions related to high-order thinking skills are generally predicted while applying the fundamental ideas of critical thinking that incorporate notions associated with critical thinking, such as assumptions, facts, concepts, value, conclusions, premises, evidence, relevance, consistency, implication, fallacy, argument, and hypothesis. Paul (1985) demonstrated that all these underlying critical thinking concepts are featured in Bloom's Taxonomy (Bloom, 1956).

While criticising Bloom's Taxonomy, Paul (1985) goes beyond simply highlighting the relationship between critical thinking and higher-order skills; he also gives the implications for instruction. That is to say, education needs to explicitly use such notions, which Paul (1985) called the fundamental principles of critical thinking, as a prerequisite for developing higher-order skills, making these skills feature in both the content and the language of instruction.

Nevertheless, there is a disagreement about how much higher-order skills and critical thinking overlap. For instance, among the significant critiques of Bloom's taxonomy that have come up from various corners of the critical thinking community is the position that the skills of "knowledge" and "comprehension" are lower-level thinking skills. In this case, McPeck (1990) criticizes the approach to assigning factual information in education, arguing that educators have not taken the necessary time to understand or appreciate the conceptual complexities of factual knowledge or its role in fostering independent thinking. In this regard, Paul (1985) also disagrees with what he sees as the narrow and reductionist conceptualisation of "knowledge". He opposes the one-way hierarchy between the categories of cognitive processes, criticising Bloom (1965) for considering knowledge as a set of unchanging facts which are 'currently known or accepted by experts in the field' (Paul, 1985, p. 38) to be retained as a collection of information. Moreover, Paul (1985) also criticises that comprehension presupposes knowledge, questioning why comprehension seems to require knowledge within Bloom's Taxonomy hierarchy design, while knowledge does not require comprehension. Then, it can be said that both Paul (1985) and McPeck (1990) agree that Bloom's taxonomy underestimates the complexity of the process involved in "knowing" something.

Other scholars suggested more intellectual skills associated with critical thinking. For example, Ennis (1996) defines critical thinking as reasonable reflective thinking, relating critical thinking to specific skills such as reflection, inferring, reasoning, and evaluating. From Ennis's point of view, these particular skills can be acquired independently and transferred to different domains. That is, without being associated with any specific discipline. Likewise, Paul (1982) stresses the skills domain, viewing critical thinking as having a deep knowledge of oneself that can help inclusively understand the world. Additionally, Siegel (1990) suggested another definition of combining skills and disposition. For Siegel (1990), critical thinking is a reasonable assessment component and a critical attitude component.

The definitions of critical thinking above emphasise reasoning skills within the skills domain. Nonetheless, there are other definitions which further recognise additional skills. For instance, according to Dawes (1988), critical thinking is associated with decision-making. For Mayer (1992), critical thinking can be involved in problem solving, whereas Kahane (1997) associated critical thinking with argument analysis. According to Scriven and Paul (1996), critical thinking is defined as the active and skilful conceptualisation, application, analysis, synthesis, and evaluation of data obtained from, or generated by, observation, experience, reflection, reasoning, or communication as a basis for belief and behaviour, requiring intellectual discipline. The latter definition, provided by the National Council for Excellence in Critical Thinking, can be regarded as an appropriate definition of the concept for classroom practices, as it incorporates the pertinent skills that can be taught at the level of middle schools. These skills encompass conceptualising, applying, analysing, synthesising, and evaluating.

However, from the perspective of a cognitive psychologist, Halpern (1999) provides a broader definition, examining all the previously mentioned definitions and including all previously identified components of critical thinking. Critical thinking, therefore, denotes the application of cognitive skills or procedures that enhance the likelihood of a favourable outcome, encompassing the cognitive processes associated with problem-solving, inference formulation, probability assessment, and decision-making, which critical thinkers employ in diverse contexts. They are inclined to engage in critical thinking (Halpern, 1999). This means that Halpern (1999) combines thinking skills and dispositions as two main components of critical thinking. Differently put, critical thinking involves assessing the results of one's reasoning, determining the quality of a conclusion, or determining the efficiency with which an issue has been resolved.

3. Bloom's taxonomy and critical thinking

To build a solid conceptual framework for the present thesis, it is pertinent to analyse and evaluate Bloom's taxonomy in this subsection thoroughly. However, the methodology chapter will present and discuss more relevant details about such a taxonomy. While reviewing literature related to Bloom's Taxonomy, it can be understood that within the context of critical thinking, there are similarities between critical thinking and what Bloom (1956) defined in his Taxonomy of Educational Objectives as higher-order thinking skills, which are analysis, evaluation and synthesis as displayed in the following table.

Table 1

Critical thinking skills

Cognitive process hierarchy	
High thinking skills	Evaluation
	Synthesis
	Analysis
Lower thinking skills	Application
	Comprehension
	Knowledge

Note: A representation of Bloom's taxonomy based on Bloom (1956)

As shown in the table above, there is a hierarchy of cognitive processes ranging from lower-level thinking skills, which comprise knowledge, comprehension, and application, to higher-level thinking skills, which include analysis, synthesis, and evaluation.

Bloom's Taxonomy (1956) outlines a sequence of tasks and levels of thinking that range from essential to highly complex. That is, these thinking skills represent a series of task complexity (Bloom et al., 1956), which categorises thinking skills into six major but different categories arranged in successive cognitive levels, starting from low levels of thinking, which are recalling information, understanding facts, meaning, applying knowledge and high levels of thinking, which are analysing, synthesising, and evaluating. The three higher levels of thinking are referred to in the literature as high-order thinking skills (HOTS). Evaluation skill is the highest cognitive level of thinking. In brief, these thinking skills progress from simple exercises like knowledge recall to more difficult ones such as analysis, which means breaking knowledge into parts; synthesis, which is the creation of new meaning; and evaluation, which means judging elements according to defined criteria (Halpern, 1999).

4. Assessment of critical thinking

This study administered a test at the end of the experiment to compare the test scores of the experimental and control groups. The primary objective was to identify and analyse notable disparities and statistically significant differences between the two groups.

As discussed earlier, it is not easy to define critical thinking due to its complexity and the various definitions belonging to different scholars. The same can be said for assessing critical thinking, since some scholars doubt whether critical thinking can be assessed, assuming it is not practical to measure the broad concept of critical thinking (Pithers & Soden, 2000). However, the chapter on literature review showed that the varied definitions of Critical Thinking contribute to its evolving picture. It is, therefore, possible to define and measure the concept of critical thinking, although there are different ways of measuring it. For instance, the Watson-Glaser Critical Thinking Appraisal (WGCTA) measures critical thinking through multiple-choice tests. Nevertheless, it has some limitations because it deals only with the ability to think critically and does not examine the disposition to do so (Ku, 2009).

To avoid this problem, Facione et al. (1994) created a set of tests to measure both critical thinking skills and the associated dispositions. These tests include the California Critical Thinking Skills Test (CCTST), a multiple-choice test, and the California Critical Thinking Disposition Inventory (CCTDI), a six-point Likert scale test. Both tests are reliable and valid and have been used in different studies, colleges and schools (Phillips et al., 2004; Facione et al., 1994). Nevertheless, these tests also suffer from some limitations because the California Critical Thinking Skills Test (CCTST) does not give a chance for test takers to think deeply, but might complete the tests by simply guessing the correct answer so it does not show the actual thinking ability of the test taker, in the same context, the California Critical Thinking Disposition Inventory (CCTDI) might not show the fundamental dispositions (Facione et al., 1995).

In line with this, some scholars have tried to measure critical thinking through written texts or test-taker performance because writing, according to Lantolf (2006), reveals both cognitive abilities and processes. For this purpose, Ennis and Weir (1985) designed The Ennis-Weir Critical Thinking Essay Test, which targets students' ability to make judgements and formulate arguments. The test results reveal students' critical thinking abilities and dispositions (Ku, 2009).

After reviewing the literature on critical thinking, it is clear that the concept is complex, as scholars across disciplines offer varying definitions. In addition, scholars have identified different levels and types of critical thinking skills, making it impossible for researchers to focus on all of them, given the breadth of the field. This reality makes it difficult and complex to evaluate critical thinking. However, for the sake of simplification, this research has opted for Bloom's taxonomy as a theoretical framework because it classifies cognitive skills into lower levels of thinking, which are knowledge, comprehension, and application, and higher levels of thinking, which are analysis, synthesis, and evaluation. In addition, Bloom's taxonomy has been considered one of the most widely used taxonomies by educators, including Bissell & Lemons (2006) and Brookhart (2010), when evaluating critical thinking in the classroom.

The levels of thinking skills identified by Bloom not only address limited higher-order thinking skills (HOTS), but they also do not encompass all the cognitive skills associated with critical thinking and other more complex intellectual skills. Nevertheless, this study has adapted Bloom's taxonomy for the analysis because this framework has been found to be more applicable to investigating critical thinking skills among Moroccan young learners of English in middle schools.

This study has combined different views, as mentioned above, and the critical thinking test is designed based on these views and the study's theoretical framework, Bloom's Taxonomy. Hence, it involves different techniques, starting from multiple-choice questions to more open-ended questions, aiming to give students more chances to measure their critical thinking skills by allowing them to think deeply and critically according to their linguistic level.

In addition to the questionnaire, this study has utilised another research instrument, the test, to collect more quantitative data. With this instrument, the researcher sought to investigate the impact of the portfolio task assignment on middle school learners' critical thinking skills. Only one test was administered at the end of the intervention. Students were asked to answer various questions independently at the end of the term.

Research instrument: The test

This study has chosen the test as the research instrument. The test questions range from simple to more challenging, but all assess students' ability to think critically. The test was designed based on Bloom's Taxonomy, a theoretical framework in education and cognitive psychology that categorises different thinking skills. It is specifically tailored to the Revised Bloom's Taxonomy Action Verbs, as defined by Anderson and Krathwohl (2001). Besides, this test explicitly measures higher-order thinking skills, namely analysing, evaluating, and creating. The following charts summarise the three significant thinking skills targeted by the test:

Table 1

Types of tasks targeted to test the skill of analysing

Targeted critical thinking skill	Analysing
Types of tasks targeted by the test	Students analyses ideas/information/texts/ pictures.
	Students compare some elements.
	Students contrasts some elements.
	Students express similarities and differences about places.
	Student describes/writes about stories.
	Students sequence events in a story.

	Students describe a picture.

Table 1 above shows that the test focused on the skill of analysing by asking students to answer different tasks that can show the development of such a thinking skill. These tasks required students to delve into and analyse various forms of content, including ideas, information, texts, and images. Students were asked to compare and contrast distinct elements, which encouraged critical thinking and a deeper understanding of the subject matter. In addition, students were asked to state the similarities and differences between different places, fostering the skill of analysis. The test also prompted students to describe and write narratives, allowing them to explore creative expression and storytelling techniques. In addition, participants were required to sequence events within a narrative to demonstrate their ability to organise thoughts logically. Lastly, students are invited to provide detailed descriptions of images to enhance their observational skills and capacity for visual analysis.

Table 2

Types of tasks targeted to test the skill of evaluating

Targeted critical thinking skill	Evaluating
Types of tasks targeted	Students evaluate ideas and information.
	Students judge ideas and give explanations.
	Students interpret a story or a picture.
	Students assess their work.
	Students express likes and dislikes about a topic and give reasons.
	Students decide on an item they can choose and explain why.
	Students engage in reflection and self-assessment.

Table 2 above highlights that the test emphasised the critical-thinking skill of evaluation through various engaging tasks. These tasks, for example, required students to evaluate ideas and information critically. Then, students were asked to form thoughtful judgments based on their evaluation. Students were also asked to provide clear explanations for their choices or ideas. Furthermore, students were required to analyse and interpret a text and a picture. They were also asked to express their preferences on a topic, supporting their opinions with well-reasoned arguments. Additionally, students are required to interpret a story or a picture, express their likes and dislikes about a topic along with reasons, select an item and explain their choice, and engage in reflection and self-assessment.

Table 3

Types of tasks targeted to test the skill of creating

Targeted critical thinking skill	Creating
Types of tasks targeted	Students compose short paragraphs using simple language.
	Students imagine an end to stories.
	Students write an opinion paragraph giving reasons.
	Students write a paragraph about their preference, justifying their choice.
	Students create new stories and events.
	Students compose and develop short paragraphs.

	Students construct simple sentences to describe pictures.
	Students invent basic stories.
	Students predict what happens next.
	Students describe pictures and write about them.

Table 3 above shows that the test also centred around the skill of creating through the use of different tasks. While being engaged, students answered the test questions, students were asked to compose short paragraphs to express their thoughts and feelings. For instance, students were encouraged to envision alternative story endings, allowing them to explore different narrative possibilities. Additionally, they were asked to write opinion paragraphs, articulating their viewpoints and supporting them with well-reasoned arguments. The test also prompted students to express their preferences in writing, where they not only stated their choices but provided justifications for their selections. Furthermore, students were asked to invent new stories and create original events, tapping into their imagination. They were further required to develop concise paragraphs that capture their ideas clearly and coherently. Moreover, the test encouraged them to invent basic narratives, stimulating their storytelling skills. In the same context, students were required to predict story endings. This kind of prediction about what might happen next in a given scenario challenged students to think critically. Finally, students were asked to construct simple sentences illustrating images, developing their ability to convey visual details through writing.

The test includes 15 questions and comprises two basic types: closed and open. The closed questions in the test are multiple-choice, where the respondent must circle or select the correct answer, and the respondent "normally just has to tick an appropriate box" (Harvey & McDonald, 1993, p. 112). While the open questions do not require the respondent to choose the correct answer, they "allow the respondents to compose their own answers rather than choosing between several given answers" (Haralambos & Holborn, 1991, p. 730). That is, open questions give respondents the chance to express themselves while answering the required questions. In addition to closed and open questions, the test includes other question types, such as inference, multiple-choice, problem-solving, funnel, evaluation, prompting, and comparison. The test is based on the Revised Bloom's Taxonomy, and the following table shows the different verb types and the associated thinking skills:

Table 4

Posttest question types and the targeted thinking skills

Question N°	Type of question	Bloom's Taxonomy Action Verb (s)	Thinking Skill (s)
1	inference	Infer	Analysing
2	Close Multiple-choice	Infer Conclude	Analysing
3	Open	Discuss Compose	Creating
4	Open Problem-solving	Imagine Compose	Creating
5	Inference	Infer	Analysing
6	Close Inference Multiple-choice	Infer	Analysing
7	Open	Explain	Evaluating

	Funnel Evaluating	Justify Compose	Creating
8	Prompting Comparison	Compare Contrast	Analysing
9	Prompting Comparison	Compare	Analysing
10	Prompting Comparison	Differentiate Contrast	Analysing
11	Open Funnel Prompting	Decide Justify Compose	Evaluating Creating
12	Open	Examine	Analysing
13	Open	Examine/ describe Write/compose	Analysing Creating
14	Open	Invent Compose	Creating
15	Open	Predict Compose	Creating

A sample of 56 test participants was divided into two groups: 28 students for the experimental group and 28 students for the control group. The participants were not randomly assigned to two equal groups. There was no random assignment because the participants were all 9th-grade students studying at Ibn Al Haytam Middle School in Martil, Mdiq-Fnideq Directorate of the Ministry of National Education, Primary Education and Sports.

5. Data analysis and presentation: Descriptive statistics of the test results

Descriptive statistics are employed to provide a detailed description of the test results obtained from both the experimental and control groups. It was observed that students in the experimental group outperformed those in the control group. Specifically, the scores in the experimental group ranged from 13/20 to 20/20, with no grades falling below the average. This indicates that the implementation of the portfolio task assignment, which served as the experimental intervention, positively affected students' performance. Furthermore, the frequency of each score is presented in the subsequent tables for comprehensive analysis.

Table 5

Test scores of the experimental group

		Frequency	Percentage
Valid	13	1	3,5 %
	15	4	14,3 %
	16	2	7,1 %

	17	5	17,9 %
	18	4	14,3 %
	19	7	25, %
	20	5	17,9 %
	Total	28	100 %

Note. This table displays results of the test scores of the experimental group

As shown in Table 5 above, the students' highest score is 20/20, while the lowest is 13/20.

As for the minimum and maximum test scores for the experimental group, they were shown in Table 13. The test scores for the experimental group demonstrated a range of performance. The lowest score recorded was 13, indicating the minimum level of understanding among participants, while the highest score reached 20, highlighting the exceptional abilities of some individuals within the group. This distribution of scores reflects the varying degrees of mastery over the material covered in the study.

Table 6

The mean scores of the experimental group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Test Scores for the Experimental Group	28	13	20	17,68	1,906

The control group's performance was analysed, revealing that most students received grades below the average. Specifically, only three students achieved scores that exceeded the average. The following chart visually represents this information:

Table 7

Test scores of the control group

		Frequency	Percent
Valid	3	2	7,1
	4	4	14,3
	5	9	32,1
	6	5	17,9
	8	2	7,1
	9	1	3,6
	10	2	7,1
	11	2	7,1
	12	1	3,6
	Total	28	100,0

that the control group had a minimum score of 3 and a maximum score of 12. This range differs from that of the experimental group, as shown by Table 4:

Table 8

Minimum and Maximum of the Test Scores for the Control Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Post-test Scores for the Control Group	28	3	12	6,29	2,551

In conclusion, based on comprehensive analysis, there is a substantial difference in performance scores between the experimental and control groups. The experimental group demonstrated notably higher scores, clearly distinguishing it from the control group, which exhibited markedly lower scores.

I. Data interpretation and discussion: The impact of the portfolio task assignment on developing critical thinking skills of Moroccan middle school learners

Quantitative data analysis using the test as a research instrument revealed that portfolio task assignments based on Bloom's Taxonomy significantly influenced secondary school students' critical thinking abilities. This was particularly evident when the test results showed that students' critical thinking abilities had improved in the experimental group participants compared to the control group participants due to the significant difference in the mean and the remarkable significance of the P-value, indicating that students who experimented with the intervention of the student's portfolio scored ahead of those who received regular instruction.

Ultimately, the results indicate a potential correlation between the participants, given that the study examines teachers and students, as they are regarded as crucial contributors to the teaching and learning processes and whose perspectives should be seriously considered in educational research. It was discovered through quantitative research that middle school teachers. They support the pedagogical recommendation to utilise portfolios to teach, develop, and encourage students' critical thinking skills, but they lament the lack of training about their use. Furthermore, the test results showed that students who experimented with using their portfolios as an intervention scored higher than those who received traditional instruction. Students' sample portfolios and test responses, on the other hand, demonstrated how their work reflected a variety of critical thinking abilities, such as analysis, evaluation, and creation; opinion expression; comparison and contrast; expressing preferences; providing justifications; knowledge construction; expressing similarities and differences; describing and interpreting images and narratives; judging concepts and providing clarifications; project design; creating original stories; self-evaluation; and demonstrating reflections. Therefore, these aspects of critical thinking abilities inferred from student productions correlate with teachers' attitudes towards the use of the student portfolio in that they emphasise the value of the student portfolio as a pedagogical tool that can help teachers and students alike, as well as the necessity of teaching critical thinking abilities to young learners as

The students in the experimental group achieved superior scores compared to those in the control group. The experimental group's scores ranged from 13/20 to 20/20, with no scores falling below the norm. The pupils in the control group performed poorly, with only three scores above the norm and the remainder of the grades falling below average. Ultimately, there exists a significant disparity between the two groups in their scores, with the experimental group achieving high scores and the control group attaining low marks.

Upon gathering the necessary data through the test, the investigation issue was addressed: the influence of the portfolio task assignment on the critical thinking abilities of secondary school students. The test resul, at the first impression, yields is that the use of the portfolio task assignment is an innovative and authentic technique for measuring students' performance and improving L2 learning (Yang, 2003), which is further supported by the literature on the efficacy and consequences of utilising the student portfolio as a teaching and assessment tool that provides insights from notable researchers in the field of educational research, including Mokhtari (2014), Rochelle (2008), Chen (2002).

Furthermore, the findings suggest a significant disparity between the average post-test scores for the two groups, with a substantial distance separating them. The average gap between the experimental and control groups in the Critical Thinking Test is 17.67 and 6.28, respectively. The statistical analysis confirms that this difference is significant. Therefore, it can be concluded that the experimental and control groups are similar in their ability to enhance critical thinking skills. This is evident from the substantial difference in scores observed in the mean test results for both groups. This reality is also supported by Herrell (2011),

pointing out that "portfolios […] allow students to demonstrate their content knowledge" (p. 12). In addition, Hinchliff (2009), in this regard, sees that the portfolio is pedagogically beneficial because it can help students recognise their personal learning needs. Similarly, Barakos and Carnahan (2008) explain that portfolios help assess students' learning outcomes and identify their needs. They also add that portfolios are reflective classroom teaching practices (Barakos & Carnahan, 2008).

According to the test result, the scores obtained from the test indicate a statistically significant difference between the means of the experimental and control groups. This is supported by the p-value being less than 0.00. The P-value is considered significant because it is below the threshold of 0.05 ($p<0.05$), indicating a statistically significant difference between the means, as presented in Table 1. As a result, the two groups are not uniform, but the variation results from the treatment they underwent, namely the experimentation with the portfolio after one semester of treatment. Therefore, it can be argued that the student's portfolio had a beneficial effect on developing students' critical thinking abilities. Therefore, this study has explored the contribution of the student portfolio to the development of Moroccan EFL middle school learners' critical thinking skills, as stated in the introduction and methods chapter.

Conclusion

Regarding the second research question, which examines the effect of the portfolio task assignment on the development of critical thinking skills in middle school learners, the quantitative data analysis indicated a significant impact. The findings revealed that students in the experimental group, who participated in the portfolio task assignments, showed notable improvements in their critical thinking skills compared to those in the control group. This enhancement was evidenced by a marked difference in the mean scores and the significance of the P-value. It was interestingly found that learners who experimented with the intervention of the portfolio task assignments scored higher than those who received regular teaching.

Provided the fact that the present study investigates teachers as well as students, because they are considered essential contributors to the teaching and learning processes whose views should be taken into account seriously in educational research, the obtained results are indicative of a possible correlation between the participants. Quantitatively, it was found that teachers in middle school education are positive about the pedagogical suggestion of implementing portfolios to teach, develop and foster students' critical thinking skills. In addition, the test results revealed that students who had experimented with the intervention of portfolios outperformed those who did not.

Meanwhile, samples of students' test answers and produced portfolios reflect various aspects of critical thinking skills, including analysis, evaluation, and creation, expressing their opinions, comparing and contrasting elements, expressing preferences, giving reasons, constructing knowledge, expressing similarities and differences, describing and interpreting pictures and stories, judging ideas and giving explanations, designing projects, inventing stories, doing self-assessment and showing reflections. Accordingly, such aspects of critical thinking skills, as deduced from students' productions, correlate with teachers' positive attitudes towards implementing the portfolio task assignment. They reflect the necessity of teaching critical thinking skills to young learners, as concluded from the teacher's views, along with stressing the importance of the portfolio as a pedagogical tool, which can facilitate this task for both teachers and learners.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

[1] Alfadhli, S. (2008). Developing critical thinking in e-learning environment: Kuwait University as a case study (PhD thesis).
[2] Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives: complete edition*. Addison Wesley Longman, Inc.
[3] Bissell, A. N., & Lemons, P. P. (2006). A new method for assessing critical thinking in the classroom. *BioScience*, *56*(1), 66–72.
[4] Bloom, B. (1956). Taxonomy of educational objectives: the classification of educational aims,handbook 1, cognitive domain. New York: David McKay.
[5] Barakos, L. & Carnahan, D. (2008). *Assessment-centered teaching: A reflective practice*. California: C&M Digitals (P) Ltd.
[6] Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*. Ascd.
[7] Chen, Y. (2002). Using porfolios at EFL junior high classrooms in Taiwan. *Using portfolios, 5*, 99-123.

[8] Cuban, L. (1984). Policy and research dilemmas in the teaching of reasoning: Unplanned designs. *Review of Educational Research*, *54*(4), 655-681.

[9] Dawes, R.M. (1988). Rational choice in an uncertain world. Orlando: Harcourt Brace.

[10] Ennis, R. (1993). Critical Thinking Assessment. *Theory into Practice,* 32 (3), 179-186. DOI.org/10.1080/00405849309543594

[11] Ennis, R. H. (1996). Critical thinking dispositions: Their nature and assessability. *Informal logic*, *18*(2). DOI: https://doi.org/10.22329/il.v18i2.2378

[12] Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. Educational Leadership, 43(2), 44-48.

[13] Facione, P. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Research Findings and Recommendations.* Downloaded 23.6.2015 from https://philpapers.org/archive/FACCTA.pdf

[14] Facione, P. A. Sánchez, C. A., Facione, N. C., and Gainen, J. (1995). The disposition toward critical thinking, Journal of General Education, 44(1): 1-25.

[15] Halpern, D. (1998). Teaching Critical Thinking for Transfer Across Domains: Dispositions; Skills; Structure Training and Metacognitive Monitoring. *American Psychologist* , 55, pp.449-455. https://doi.org/10.1037/0003-066X.53.4.449

[16] Haralambos, M. and M. Holborn. (1991). *Sociology: Themes and Perspectives*. London: Harper Collins.

[17] Harvey, L. and M. McDonald. (1993). *Doing Sociology: A Practical Introduction*. London: McMillan Press LTD.

[18] Herrell, A. (2011). *Teaching in the elementary school: A reflective action approach.* USA: Pearson Education.

[19] Hinchliff, S. (2009). *The practitioner as teacher*. Philadelphia, PA: Elsevier Limited.

[20] Kahane, H. (1997). *Logic and contemporary rhetoric*. Belmont. Calif.: Wadsworth.

[21] Ku, K. Y. L. (2009). Assessing students' critical thinking performance: Urging for

[22] measurements using multi-response format. *Thinking Skills and Creativity, 4*, 70-76.

[23] Lantolf, J. P. and Thorne, S. L. (2006). *Sociocultural Theory and the Genesis of SecondLanguage Development*. Oxford: Oxford University Press.

[24] Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory into practice*, *32*(3), 131-137.

[25] Mayer, R. E. (1992). *Thinking, problem solving, cognition*. WH Freeman/Times Books/Henry Holt & Co.

[26] McPeck, J. (1990). *Teaching Critical Thinking.* London: Routledge.

[27] Mokhtari, K. (2014). Portfolio assessment in teacher education: Impact on preservice teachers' knowledge and attitudes. Journal of Teacher Education, 47, 245- 251.

[28] Morgan, W. R. (1995). Critical Thinking: What does that Mean? Searching for a definition of a crucial intellectual process. *Journal of College Science Teaching, 24*(5), 336-340. Retrieved October 27, 2017, from http://www.jstor.org/stable/42989611

[29] Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J. & Newton, D.

[30] (2005). *Frameworks for Thinking: A Handbook for Teaching and Learning*. Cambridge: Cambridge University Press.

[31] Paul, R.W. (1982). Teaching critical thinking in the 'strong' sense: a focus on self-deception, world views and a dialectical mode of analysis', In*formal Logic Newsletter, 4(2)*, pp. 2–7.

[32] Paul, R. (1995). The critical connection: Higher order thinking that unifies curriculum,

[33] instruction, and learning. In J. W. Willsen & A. J. A. Binker (Eds.), Critical thinking: How to prepare students for a rapidly changing world (pp. 103-151). Santa Rosa, CA: Foundation for Critical Thinking.

[34] Pillips, C. R. et al. (2004). The California Critical Thinking Instruments for Benchmarking, Program Assessment, and Directing Curricular Change, *American Journal of Pharmaceutical Education, 68*(4), article 101.

[35] Pithers, R. T. and Soden, S. (2000). Critical thinking in education: *A review, Educational Research, 42* (3), 237-249.

[36] Rochelle, I. (2008). A study on portfolio assessment as an effective student selfevaluation scheme. *The Asia pacific-education researcher, 16*, 23-32.

[37] Scriven, M., & Paul, R. (1996). Defining critical thinking. A draft statement for the national council for excellence in critical thinking. The Critical Thinking Community: Foundation for Critical Thinking. Retrieved October 15, 2023, from http://www.criticalthinking.org

[38] Siegel, H. (1990). *Informal logic and the nature of critical thinking*, in McPeck, J.E. (ed.) Teaching critical thinking. London: Routledge, pp. 75-85.

[39] Sternberg, R. (1986). *Critical Thinking: Its Nature, Measurement and Improvement.* Downloaded 3.4.16 from: http://files.eric.ed.gov/fulltext/ED272882.pdf

[40] Yang, N. D. (2003). Integrating portfolios into learning strategy-based instruction for EFL college students. *International Review of Applied Linguistics in Language Teaching*, *41*(4), 293-317. https://doi.org/10.1515/iral.2003.014